WPS4316

POLICY RESEARCH WORKING PAPER 4316

Who Fears Competition from Informal Firms?

Evidence from Latin America

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The World Bank
Financial and Private Sector Development
Enterprise Analysis Unit
August 2007

Policy Research Working Paper 4316

Abstract

This paper investigates who is most affected by informal competition and how regulation and enforcement affect the extent and nature of this competition. Using newly-collected enterprise data for 6,466 manufacturing formal firms across 14 countries in Latin America, the authors show that formal firms affected by head-to-head competition with informal firms largely resemble them. They are small credit constrained, underutilize their productive capacity, serve smaller customers, and are in markets with low entry costs. In countries where the government is effective and business regulations onerous, formal firms in industries characterized by low costs to entry feel the sting of informal competition more than in other business environments. Finally, the analysis finds that in an economy with relatively onerous tax regulations and a government that poorly enforces its tax code, the percentage of firms adversely affected by informal competition will be reduced from 38.8 to 37.7 percent when the government increases enforcement to cover all firms.

This paper—a product of the Enterprise Analysis Unit, Financial and Private Sector Development Department—is part of a larger effort in the department to study and promote reforms in the business environment. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at flamanna@worldbank.org.

Who fears competition from informal firms? Evidence from Latin America

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Keywords: Informality, Competition, Regulations, Latin America, Manufacturing

JEL: D21, D40, L51, L60, N66, O17,

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Introduction

In a 2006 World Bank survey of firms of 14 Latin American countries,[2] 38.7 percent of manufacturing firms ranked competition from informal firms as a one of their top three obstacles to doing business, ahead of issues such as tax rates and access to finance. Yet there are wide differences between countries as to how seriously informal competition affects formal firms. In Uruguay, 55.6 percent of firms rate competition from informal firms as one the top three obstacles; while only 18.9 percent of firms in Panama consider informal competition a serious obstacle.

While competition is an engine of economic growth in most markets since it induces higher rates of productivity growth, competition between formal and informal firms is not necessarily productive. Informal competition is damaging to overall economic performance since the cost advantage informal firms enjoy is a result of ignoring many or all business regulations.

There are also cost disadvantages to informality. Some of these disadvantages stem from inaccessibility to formal credit markets and to the courts (Djankov et al, 2003). This makes informal firms less efficient. For example, to compensate for the lack of legal protection that courts provide, informal firms make deals that are small to minimize possible losses and they make these deals with parties where there are long-established relations. Small contracts, however, usually entail high fixed costs. Also, limiting transactions to parties with whom informal firms have long-established relations means that informal firms exploit only a small and narrow set of market opportunities. Inefficiencies and limited markets is the price of reducing uncertainty and insuring against losses in the informal sector.

Given these cost disadvantages, why do some firms decide to stay informal? For some firms informality affords them cost advantages that allow them to compete profitably. The focus of this paper is to determine the nature of the competitive effects informal firms' cost advantages have against formal firms. We do this by looking at formal firms most affected by informal competition. We find that some formal firms are more adversely affected by competition from informal firms than others and we examine why these are more affected based on their characteristics and the environments in which they operate.

The business environment matters in determining the nature and size of the cost advantages of informality. The higher the regulatory burdens of being formal, the higher are the savings from informality. This cost-benefit calculation affects the size of the informal sector as

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[2] Data are comprised of the following 14 countries in Latin America; Argentina, Bolivia, Chile, Colombia, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru and Uruguay. For a more detailed description of the data see next section or visit www.enterprisesurveys.org.

higher savings from being informal draws more firms to informality, resulting in a bigger informal sector (Djankov et al 2002, Schneider 2000). While the size of the informal sector is an important factor in determining the competitive effects on formal firms—more firms in a market generally means more price competition—regulation is most importantly a major determinant of the intensity of competition from the informal sector.

The government's capacity to enforce regulations also matters in the assessment of the cost of regulatory obligations firms face. An informal firm's chances of getting caught for not complying with laws and regulations are a direct function of the government's capacity to enforce these.

The two points above on the determinants of the size and intensity of informal competition are the central focus of this paper. We investigate for which firms and in what environment competition from the informal sector affects formal manufacturing firms most. We find that firms most concerned about competition from the informal sector are those that resemble informal firms the most. Moreover, we find that in economies where the government's ability to enforce rules is high and business entry costs, and labor and tax regulations are relatively onerous, firms in industries with low costs to entry are more likely to cite informal competition as a constraint difficult to overcome.

We reach the findings by analyzing data from the 2006 Latin American regional roll-out of the World Bank's Enterprise Surveys.[3] The data covers over 6,400 formal manufacturing firms from 14 countries in South and Central America. The data provide information on the business environment in each economy, details of firm-level operations, and specifics on the quality of services and infrastructure that these firms use. We also use the *Doing Business* indicators[4] to obtain measures of the regulatory burdens in each country. We use the World Bank Institute's *Worldwide Governance Indicators*[5] (Kauffman, Kraay and Mastruzzi, 2007) index to assess each government's ability to effectively enforce laws and regulations on their books. Together, the *Doing Business* and the *Worldwide Governance Indicators* give us a measure of effective regulation.

The paper is organized as follows. In Section 1, we introduce the hypothesis as to which formal, manufacturing firms will be most affected by informal competition. We describe our data, the econometric model and the variables used to test our hypothesis. Section 2 examines the features of the business environment that may explain in which countries informal competition is

[3] Data can be downloaded at: www.enterprisesurveys.org.
[4] Data can be downloaded at: www.doingbusiness.org.
[5] Data can be downloaded at: http://info.worldbank.org/governance/wgi2007/

most effective (hurts the most) against formal firms. In Section 3, we investigate which business environments are more conducive to effective informal competition. Section 4 concludes.

1 The data

The data we use come from three World Bank datasets; Enterprise Surveys, *Doing Business* and the *Worldwide Governance Indicators*.

The *Enterprise Surveys* collect data from key manufacturing and service sectors in every region of the world. For our analytical purposes, we focus on manufacturing firms and we use the 2006 World Bank Enterprise Surveys for Latin America. In this newly collected roll-out, 6,466 formal manufacturing firms were surveyed in fourteen Central and South American countries; Argentina, Bolivia, Chile, Colombia, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru and Uruguay. The Enterprise Survey roll-out in Latin America was done at the same time and with the same questionnaire and the same survey implementation and sampling strategy. Given the standardized methodology (discussed below) the data are optimized for the type of cross-country comparisons employed throughout this paper.

The surveys employ standardized survey instruments and a uniform sampling methodology to minimize measurement error and to yield data that are comparable across economies. The sampling methodology of the Enterprise Surveys generates sample sizes appropriate to achieve two main objectives: first, to benchmark the investment climate of individual economies across the world and, second, to conduct firm performance analyses focusing on determining how business environment constraints affect productivity and job creation in selected sectors. The universe of industries is stratified by region, size and industry. The number of manufacturing industries to be defined as an individual stratum in each country is chosen based on the Gross National Income (GNI) level of each country.

The standardized Enterprise Survey questionnaire includes both objective and subjective questions referring to the business environment. Subjective variables are based on the perceptions of the surveyed firms regarding key factors that constrain their operations. The objective questions refer to specific quantifiable measures of firms' activities (sales, number of workers, type of credit received, etc.) and objective description of constraints they face (number of power outages, number of days to get an electricity connection, losses due to theft, etc).

To measure the fixed and variable regulatory costs that a firm incurs to start and operate a business in Latin America we use several of the 2006 *Doing Business* indicators. The *Doing Business* database provides comparable, objective measures of business regulations for 175

economies. We use the following indicators; the cost of starting a business (percent of per capita income), cost of obtaining a license (percent of income per capita), the minimum capital requirement to start a business (percent of per capita income), cost of registering property (percent of property value), the level of tax on profit and on labor and the employment cost. A more detailed description of the each variable and how each country performs in the region follow.

The World Bank Institute's *Worldwide Governance Indicators* measure, for over 200 countries and territories worldwide, six dimensions of governance: voice and accountability political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. These indicators are based on several hundred individual variables measuring perceptions of governance, drawn from 37 separate data sources constructed by 31 different organizations. We are interested in measures of the government's capacity to enforce its laws fairly, consistently, and effectively. In our model we include one governance indicator; government effectiveness.

1.1 The dependent variable

The Enterprise Surveys contain sets of questions that obtain opinions on the difficulty of overcoming regulatory obligations and other important obstacles that managers must navigate around in running their businesses. The data we use measure the relative impediment of informal competition on manufacturing firms in the formal sector based on the opinions of managers asked to name rank the severity of obstacles to their operations. More specifically, firms in all countries are asked to rank the top-three obstacles that affect operation and growth of their establishment. A list of sixteen (16) potential obstacles is provided; access to finance, access to land, business licensing and permits, corruption, crime, theft and disorder, customs and trade regulations, electricity, functioning of the courts, inadequately educated workforce, labor regulations, political instability, macroeconomic instability, practices of competitors in the informal sector, tax administration, tax rates and transportation.

For each country, we record whether a manager of a firm ranked "Practices of competitors in the informal sector" as either the first, second or third biggest obstacle. We construct a variable that takes on the value of one (1) if the manager ranked the obstacle in the top three and zero (0) otherwise. The hypothesis is that formal firms that rank the informal competition as a top three obstacle are most likely to resemble informal firms since they compete in the similar sectors, in the same market, using similar technologies.

1.2 The explanatory variables

We begin with variables of interest that have often been cited in the literature as characteristics of establishments most likely to face informal competition. The variables of interest are:

1. **Size** – We hypothesize that small firms are more affected by informal competition. For each firm in the sample, we use the log of the firm employment as the size variable.
2. **Use of formal finance** – Limited access to financial services is one of the main constraints for informal firms (Morrisson 1995). We use a measure of the use of commercial lines of credit used as a way to assess the level of access to finance that firms have. In our sample, over 57.4 percent of manufacturing firms have an overdraft facility, 49.6 percent have an outstanding loan or line of credit from a financial institution, and 39.4 percent of firms said that they did not need a loan. Moreover, only 37.3 percent of our sample has *both* a line of credit or outstanding loan *and* an overdraft facility. When we take these firms and the 39.4 percent of those firms that said that they did not need a loan, we have 69.1 percent of firms that are neither credit constrained and/or are above average users of financial services. The remaining 30.9 percent are the firms most likely to be in head-to-head competition with informal firms. We create a binary variable where a value of one (1) indicates a firm that is credit constrained.
3. **Capacity utilization** – A recent World Bank study on informality in Latin America points out that "formality rises rapidly with firm size and productivity" (pg. 135; Perry et al, 2007). We use capacity utilization as a measure of productivity to see if the continuum between formality and productivity found in that study also holds with respect to the competitive pressure from informal firms that formal firms have to overcome. As before, we argue that firms that are less productive, therefore tending to be more like informal firms, face informal competition more directly than more productive formal firms.
4. **Buyer** – We hypothesize that firms that have large buyers as their customers are markedly different from informal firms and will therefore not be in direct competition with them. Having large buyers as customers requires that the firm supply at large volumes and at the lowest price since large customers have the bargaining power to push prices low. In order to satisfy both of these requirements, this implies economies of scale by the supplying firm. Furthermore, in order to satisfy their standards of quality and consistency, large buyers usually require stable, long-term business to business relationships most often associated with older, established suppliers. These requirements may not be easily satisfied by informal firms, making the informal sector

less of a threat for firms that sell their products to large firms. The binary dummy variable takes on a value of one (1) when the firm's main buyer of its outputs are medium-size private firms (20-100 workers), small private firms (fewer than 20 workers, or individuals, and a value of zero (0) otherwise.

5. **Exporter** – For reasons of competitiveness, scale, technology, access to markets, access to credit, uncertain legal status, fixed costs of exporting, etc., informal firms are neither able nor willing to compete in export markets. For this reason, we include a dummy variable, where the value of one (1) represents an exporter and zero (0) does not.
6. **Industry** – The industry dummies are used as control variables. The signs of their regression coefficients are also of interest to us. We expect that industries with higher fixed cost of entry, such as chemicals, machinery, electronics and metals, face less informal competition than firms where the cost of entry is relatively lower. High costs of entry deter informal firms in three ways. First, informal firms have little capital, and poor access to financial markets, with which to finance entry. Second, informal firms have a relatively shorter time horizon with which to reap returns of their investments. Since informal firms face a greater uncertainty to their survival, investments must have more immediate returns. Lastly, higher fixed cost industries are usually characterized by economies of scale. Informal firms rarely achieve the size required to reap these economies and are therefore at a cost disadvantage against much larger, formal firms. In the appendix, there is a list of industries (at the 2-digit ISIC level) included in each industry category. We expect the industry dummies for high, fixed cost industries (chemicals, machinery, electronics and metals) to be negative, in comparison to the comparator industry (food processing), and positive for all other industries.
7. **Financial dependence** – In our second econometric specification of our model, we substitute the industry dummies for the industry-level Rajan-Zingales (1998) classification of industry sector. This index is based on how much external financing firms in each industry need to operate and grow. We use this index as a proxy for capital intensity and entry costs. Higher values of this index mean that the industry is comparatively more dependent on external financing. Higher dependence on external financing translates into higher costs of entry which indicates a lower likelihood of being exposed to direct competition from informal firms.

Next, we list variables that represent the regulatory cost that a firm incurs in starting a business and operating it. We chose to include only regulations that force firms to incur monetary costs of taxes and start-up regulations.[6] Also, we limit our focus to start up costs and taxes since these are the regulatory costs most cited by the informality literature as the greatest deterrent, and the greatest cost savings, to firms staying informal (Perry et al 2007).

8. **Tax rate** – This *Doing Business* indicator refers to the tax that a company must pay or withhold in a given year. It also measures the administrative burden in paying taxes. Taxes are measured at all levels of government. In our sample, firms in Argentina pay the highest total tax rates (117 percent of profit) and Uruguay the lowest (28 percent).
9. **Tax on profit** – This *Doing Business* indicator is a subset of the *tax rate* variable described above. This variable measures the amount of taxes on profits paid by the business as a percentage of commercial profits. It is reported as a rate of commercial profits. Guatemala and Mexico have the lowest tax rates on profits; 2.7 and 5.3 percent of commercial profits. Bolivia and Nicaragua have the highest tax rates on profits; 62.7 and 27 percent, respectively.
10. **Tax on labor** – This variable is also a subset of the *tax rate* variable and it specifically measures the amount of taxes and mandatory contributions on labor paid by the business as a percentage of commercial profits. This amount include mandatory social security contributions paid by the employer both to public and private entities, as well as other taxes or contributions related to employing workers. Colombia has the highest tax rates on labor (31.76 percent of commercial profits). Argentina and Mexico are close seconds with 30.2 percent in each country. The lowest tax rates on labor in the region are in Chile, Uruguay, Honduras and El Salvador at 3.9, 7.2 11.0 and 11.6 percent, respectively.
11. **Tax other** – This *Doing Business* indicator measures the amount of taxes and mandatory contributions paid by the business that are not already included in the previous two categories; taxes on profits and taxes on labor. In this category, Argentina records a rate of 75.9 percent, Colombia a rate of 25.9 percent and Guatemala, Honduras and Nicaragua tax rates on other items of 23.4, 22.7, and 19.7 percent, respectively. These five economies have the highest rate of taxation for this category in

[6] Including the number of procedures and time to get taxes paid and a start-up license in our econometric specification did not change the empirical results of our model. We can provide these results as requested.

our sample. In nearly all other countries, there is negligible tax rates applied to this category of taxes.

12. **Cost to start a business** – The total cost to start up an industrial or commercial business. These include obtaining all necessary licenses and permits and completing any required notifications, verifications or inscriptions for the company and employees with relevant authorities. The largest cost in the region to open a business is found in Bolivia where on average new incomers in the market pays 141 percent of per capita GNI, while the cheapest in Chile (9.8 percent of per capita income).
13. **Minimum capital requirement to start a business** – This *Doing Business* indicator records the paid-in minimum capital requirement that the entrepreneur needs to deposit in a bank before registration starts. The amount is typically specified in the commercial code or the company law. In order to make that data comparable across countries, the minimum capital requirement is computed as percent of per capita income, for example in Ecuador and Mexico the paid-in minimum capital recorded is 7.7 percent and respectively 12.5 percent of per capita income.[7]
14. **Government effectiveness** – According to World Bank Institute's *Worldwide Governance Indicators* (Kauffman et al, 2007), this variable measures the quality of public and civil services and the degree of its independence from political pressures, the quality of policy formulation and implementation and the credibility of the government's commitment to such policies. For each indicator on government effectiveness, higher scores correspond to better outcomes. In this group of 14 countries, Chile and Uruguay perform best in the region for the two governance indicators while Ecuador and Paraguay are the worst performers.

In the Appendix to this paper, Table 1 lists the data source for each explanatory variable we use in our regressions and describe how the explanatory variables are constructed. Table 2 shows the main descriptive statistics for all variables of interest (number of observation, mean and standard deviation, maximum and minimum).

1.3 Who fears informal competition?

We test our hypothesis that formal firms most resembling informal firms are more likely to be affected by informal competition with the following probit regression:

[7] The methodology was developed in Djankov and others (2002) and was then slightly modified. To get additional information on the methodology and to download the data, the reader should go to www.doingbusiness.org

$$Y_{ijk} = C + \lambda F_j + \gamma X_{ijk} + \varepsilon_{ijk} \quad (1)$$

The dependent variable (*Y*) is a binary variable constructed to indicate a one (1) if firm (*i*) in industry (*j*) in country (*k*) considers competitors from the informal sector to be one of the top-three obstacles for their businesses and zero (0) otherwise. The dependent variable is a function of a constant (C), a variable (F) that is either an industry dummy for specification or a sector-level measure of the financial dependence of industries used in the other specification of this model. A vector of characteristics of the firm (X) that includes the size of the firm, in logarithm, the extent to which a firm is credit constraint, a dummy to measure whether large or small buyers are its customers, rates of capacity utilization, and the log of the age of the firm. Finally, the variable (ε) represents the error term. In an alternative estimation, we replace the variable for the financial dependence of industries (F) with industry dummies as proxies for how easy or difficult it is to enter into certain industries. We discuss this alternative explanation in a section on sector effects.

In estimating Equation (1), we include control variables, such as industry and country level fixed effects. We also cluster at the industry and region levels. The term ε is an error term which is potentially heteroskedastic that may be correlated across all firms within each region within the country and within each industry. We note that in some countries, large ones especially, measures of informal competition is a regional, more likely local, phenomenon. This makes sense. Informal firms are likely to compete for and in local markets. It would be unusual to see informal firms that could supply markets nationally and much less internationally. For this reason, we think that it is reasonable, and less restrictive, to assume that the effects of informal competition are regional and not national. Therefore, we calculate robust standard errors that allow for clustering by region. Lastly, because the cost and demand structures vary by industry, we use clustering at the two-digit ISIC industry level because we expect that there exists independence of observations between industries but not within.

1.4 Empirical results

We provide the empirical results of our model and the correlation matrix among independent variables in tables 3 and 4 of the Appendix. We find support for the proposed hypothesis that those firms most likely to identify informal competition as a primary obstacle to their businesses are also firms that are most similar in characteristics to firms in the informal

sector; generally smaller, credit constrained and less capital intensive firms cite adverse effects from informal competition.

The results of our probit regression are largely as expected (Table 3); formal manufacturing firms that are smaller, serve smaller customers, are less efficient and depend less on formal credit markets than others.

Some unexpected results are evident as well. While we would expect younger firms to be most under competitive threat from informal firms, since informal firms are also relatively young, this is not the case in our data. In fact, there is a strong, robust statistically significant positive correlation between the age of the firm and the severity of the perceived competitive threat from informal firms.

Many explanatory variables—age, exporter, size of customers served—are highly correlated with the size of a firm (see Table 4), but as we can see in our regressions, once we introduce those highly correlated variables, one at a time, the coefficient on size in each equation does not vary nor does its statistical significance, indicating that the results are robust.

1.5 What to make of the industry effects?

While we did not report the coefficients for the industry dummies in Table 3, we do so in Table 3.a of the Appendix. In examining these empirical results, they show that firms in industries commonly characterized by relatively high fixed costs are also firms that did not see informal competition as one of the top three obstacles to the operation and growth of their business. Given this empirical result, we examine whether this is a robust and statistically important pattern.

Our empirical results show that heavy industries, those with high fixed costs such as chemicals, electronics, machinery and equipment, paper and paper products and manufacturers of non-metallic minerals products, are generally less concerned about informal competition than are industries in sectors with lower fixed costs such as textiles, food products, or garments. Since high fixed costs translate into high cost of entry, no matter what the business environment, there exists low likelihood that informal competition would be a threat to these heavy industries in comparison to low fixed cost sectors.

A more direct way to test this hypothesis, that industries with high fixed costs are less susceptible to the direct competition from the informal sector, is to find a measure for fixed cost, or entry costs, and test the hypothesis directly. We substitute the industry dummies with direct measures of fixed costs. We use the Rajan-Zingales (1998) classification of industry sector based on how much external financing firms need to operate and grow. We use this index as a

proxy for capital intensity and therefore entry costs. The Rajan-Zingales classification relied on a particular measure, the median firm's dependence on external finance, to categorize each industry's universal and constant technological characteristic that distinguishes it from other industries. The index is constructed so that higher values mean that the industry is comparatively more dependent on external financing. Given the pattern observed from the probit regression with industry dummies, our hypothesis is that higher dependence on external financing translates into higher costs of entry which translates into a lower likelihood of being exposed to direct competition from informal firms.

The empirical results support our hypothesis. The two model specifications, one with dummy variables for industry at the two-digit ISIC level (Table 3.a) and the other with the Rajan-Zingales financial dependency variable (Table 5) point in the same direction; the negative coefficient for the financial dependence variables indicates that firms in more capital intensive industries, holding everything else constant, will be less affected by competitive threats from informal firms.

2 Is informal competition a serious obstacle in Latin America?

In this section we study how the business environment affects the level of competitive intensity between the informal and formal sectors. The competitive intensity is a function of the costs that informal firms avoid as a result of not complying with some or all legal obligations. If the cost of regulatory compliance is high, then formal firms will have a cost disadvantage against informal firms and will suffer in head-to-head competition. So the existence of high levels of regulation. For these reasons, it is important to examine the relationship between how difficult it is for firms to overcome informal competition and the nature of the regulatory environment.

As discussed in the introduction, about 40 percent of all manufacturing firms in Latin American consider informal competition as one of the top-three most serious obstacles. That informality is the number one obstacle in Latin America is not surprising. Latin America has long been cited as a region with a very large and very active, and growing, informal sector. Estimates by Schneider (2005) over the size of the informal economy in 145 countries across the globe indicate that Latin America has the second highest rate of informality, trailing only Africa. The question then is why informality is so high in a region where most countries are middle income and informality is an issue most associated with low-income countries.

Part of the explanation for Latin America's large informal sector may be the region's business environment; poor regulatory and institutional quality that prevails in many countries in

the region. The relative difficulty of entry and exit, mandatory compliance with time consuming norms and regulations, excessive red tape and bureaucracy, unclear rules of the game, and a weak rule of the law, are among several governance-related factors that significantly increase the cost of doing business. The strong impact of an inefficient and burdensome regulatory environment is well documented (Guasch and Hahn, 1999, WDR 2005). The point of institutional quality and its effects on informality are also made by Loayza, Oviedo and Servén (2004).

That Latin America has burdensome regulation is illustrated a World Bank report on the investment climate (World Bank 2007). In that report, a majority of Latin American countries (about two-thirds) are below the institutional quality that income levels and levels of economic development predict for countries in the region. Latin America also performs poorly with regard to the Ease of Doing Business indicators produced by the *Doing Business* data we discussed earlier. Latin America is the region with the largest number of both procedures (12) and days (66) required to start a new business. This compares with 9 procedures and 56 days in East Asia, or 7 procedures and 24 days in high income countries. Africa performs better than Latin America with respect to the number of days (11) and procedures (64) required to start a business. Latin America also scores poorly when we focus on the time required to enforce contracts – 470 days, compared to 423 in East Asia and 282 in high income countries. Similarly, according to the IMF Latin America is the region with the highest (i) total number of taxes paid by businesses (49); (ii) number of hours per year needed to prepare, fill an pay taxes (549); and (iii) taxes paid as a percentage of profit (54.5 percent). This compares to 40 taxes, 398 hours and 48.5 percent of profits in the average low and middle income country, and 18 taxes, 181 hours and 38.8 percent of profits in the average high income country.

Whether these regional conditions hold at the country level is the focus of the next section.

2.1 Is informal competition a serious obstacle in all countries in Latin America?

Though informality is prevalent in Latin America, the countries in which firms cite informal competition as the most serious obstacle are a surprise. For Uruguay, Colombia, Paraguay, and Peru, competition from the informal firms is reported as the top obstacle. This is surprising since there is little correlation between the estimated size of the informal sector and whether formal firms identify informal competition as an obstacle to doing business. In a recent IMF study that estimates the size of the informal economy in most economies of Latin America, Vuletin (2006) finds that Paraguay, Nicaragua and Honduras have the largest informal

economies with respect to their estimated contribution to GDP (see Table below from Vuletin, 2006). While Paraguay is one of the countries in our sample in which firms identify informal competition as a top constraint, Nicaragua and Honduras are not. In addition, Uruguay, the country in which the largest percentage of firms that identify informal competition as a top constraint, the informal economy is comparatively small (36.2 percent of GDP). The correlation between the percent of firms citing informal competition as a top three constraint and the estimated size of the informal economy gives us a low correlation of 0.019.

Size of the informal economy (% of GDP)

Country	*Percent of GDP*
Mexico	28.2
Brazil	28.4
Chile	32.1
Argentina	32.9
Uruguay	36.2
El Salvador	36.4
Peru	38.1
Guatemala	42.3
Colombia	43.5
Panama	44.4
Ecuador	50.7
Honduras	54.1
Nicaragua	64.4
Paraguay	68.2

Source: Vuletin (2006): Table 3.

The results of this correlation may seem counterintuitive since we would expect a strong relationship between larger informal sectors and greater competition stemming from it. The argument is that the size of the informal sector is good indicators of the level of competition formal firms contend with in their markets. As is shown above, we do not find that and it is clear in our data, the size of the informal sector does not determine the level of competition it presents to firms in the formal sector. But if size of the informal sector is not a determinant of competition, what is?

3 What environments are associated with intense informal competition?

In most developing countries, regulatory and legal obligations can be avoided where governments are incapable of enforcing all or some of its laws. In that type of environment, firms can choose to comply or not comply with these rules and regulations and bear or not bear the costs of compliance.

The presence of avoidable regulatory costs has competitive effects on the intensity of competition between formal and informal firms. Each legal or regulatory obligation that a firm chooses to avoid translates into a cost advantage that this firm enjoys against all competing firms that complied and did not avoid these costs. A business environment that has more regulatory and legal obligations on formal firms than other environments will also provide a longer menu of costs that firms can choose to avoid. Therefore, the more regulations that exist, the greater the potential cost differential between informal firms that comply with none of these regulations and the formal firms that comply with all (many or some) of them.

The presence of a larger menu of avoidable costs exacerbates the deleterious effects of informal competition in industries characterized by low entry costs. Our previous empirical findings showed that industries with high fixed cost are generally unaffected by informal competition. Firms in industry where the costs of entry are low are under greater competitive threat from informal firms all things being equal. In environments with high regulatory requirements this competitive pressure for low cost of entry firms is exacerbated because the cost differentials between formal and informal firms are potentially higher. In economies with high regulatory costs, informal firms enter markets where formal firms incur relatively high compliance costs, and against them, informal firms enjoy the substantial cost advantages of skirting some or all of the many laws and regulations. In sectors where informal firms do not enter because of high costs of entry, formal firms are not likely to be affected no matter what the regulatory compliance requirements entail.

3.1 Hypothesis

Past studies established a positive correlation between the scope and number of regulations and the size of the informal sector (Djankov et al 2002, Botero et al 2003, Loyaza, Oviedo, and Servén 2005). However, in our data, the size of the informal sector is not a factor in explaining where informal competition is most effective. We hypothesize that the cost differential, based on avoided regulatory costs, between formal and informal firms is a major determinant of competitive effectiveness. The regulatory environment determines competitive effectiveness of the informal sector by how large that cost differential is between firms that

comply with the rules and regulations and those that do not. A combination of the extent of regulation and the government's effectiveness in enforcing these determines how effective informal competition will be.

The number of laws and regulations is not the only factor that determines how onerous the regulatory environment is. The government's capacity to implement and enforce these rules and regulations is an important determinant of how difficult the legal and regulatory requirements may be. If the government is lax or incapable in its implementation of the rules and regulations, laws on its books will count for naught. A firm's decision to comply or not comply with its legal and regulatory requirements is based on the probability of getting caught for non-compliance and the nature of the punishment. If the many regulations on the books are not implemented and enforced, the probability of getting caught is rather low and the inducements for non-compliance are rather high; for both formal and informal firms.

Taking what we have learned in this paper about the relatively higher competitive threat that informal firms present formal firms in low entry cost industries and the hypothesis we present above about the relationship between effective competition and the level of regulations and the government's capacity to enforce these, we hypothesize that as effective regulation increases, firms in industries with relatively lower entry costs will feel the sting of informal competition more than firms in industries with relatively higher entry costs. In other environments, the differences between low and high entry cost industries will be indistinguishable.

Firms in industries with low fixed costs, which mean that there are low entry costs, will more significantly feel the sting of informal competition in countries with high levels of government capacity and high levels of regulation because the cost differential between informal firms and formal firms will be highest in this environment. In countries with high levels of government capacity and onerous regulation, informal firms risk being caught for skirting the rules but benefit substantially from doing so. Given the high level of regulatory costs that informal firms avoid, they enjoy substantial cost advantages against formal firms that are forced to comply with regulations under the effective vigilance of a capable government. In all other environments, firms in low entry cost industries will be relatively indifferent to informal competition since either regulatory requirements are not that stringent or enforcement is so lax that even formal firms skirt the rules and dissipate most of the cost advantages that informal firms may enjoy from not complying with the rules.

Below, we present the empirical strategy we use to test this hypothesis.

3.2 Empirical strategy

We test the hypothesis that firms in industries with relatively lower entry costs will be most adversely affected by informal competition in economies where there exists a relatively onerous set of government rules and regulations and a government with the capacity to enforce these.

To confirm or reject the hypotheses presented above, we provide an econometric specification with a set of regulatory and law and enforcement variables to measure the relative level of regulatory obligations in an economy, and a government effectiveness variable to measure the capacity of government to enforce these rules. The description of the main business environment and the government effectiveness variable, their sources and the expected relation to the dependent variable can be found in Section 1.2 above. For the econometric specification, we use the regulatory indexes, from *Doing Business*, and the government effectiveness index, from the *Worldwide Governance Indicators*, to divide the countries in the data into four groups; good performers and bad performers with respect to the regulatory environment and within those two groups we divide further into good performers and bad performers with respect to government effectiveness.

The regulations examined are: tax rates, tax on profits, tax on labor, and taxes on other aspects of commercial operations not included in profits or labor. We also use the cost of starting a business and the minimum capital requirement to obtain an operating license. We use each of the rules and regulations and include them separately as independent variables in our econometric model.

In order to test our hypothesis we introduce in the linear probability model regression[8] of with the same variable specification we introduced in Section 1.4 and add an interaction term between the business environment (level of regulation and government capacity) and financial dependency (Rajan-Zingales scale) as the proxy for the cost of entry; the higher the financial dependence the high the cost of entry. The econometric model appears as:

$$Y_{ijk} = C + \lambda_k (F_j \times E_k) + \gamma X_{ijk} + \varepsilon_{ijk} \qquad (2)$$

The dependent variable (Y) is a binary variable takes on the value one (1) if firm (*i*) in industry (*j*) in country (*k*) considers competitors from the informal sector to be one of the top-three

[8] Because we wanted a clear interpretation of the interaction terms, we did not use maximum likelihood methods used in discrete choice models to estimate the discrete, 0 or 1, dependent variable.

obstacles for their businesses and zero (0) otherwise. The dependent variable is a function of a constant (C), a variable (F) to represent the financial dependence of industries interacted with a categorical business environment variable (E) that correspond to the four (4) categories described above, and a vector of firm characteristics (X), as in the previous specification, and an error term (ε). In estimating Equation (2), we include country level fixed effects and we cluster at the industry and regional levels.

We are interested in the sign, positive, negative or zero, of the interaction terms between effective government regulation (the product of government effectiveness and level of regulation) and the level of financial dependence. The expected sign of the interaction terms are for each of the four country categories is:

1. For countries in which there exists high levels of government capacity and high levels of regulation, firms in industries with low costs to entry will be more adversely affected by this environment than other industries, the coefficient for the following term will be negative: $0 < \lambda_1 (F_j \times E_1)$;
2. For countries in which there exists high levels of government capacity and low levels of regulation, firms in industries with low costs to entry will not be any more adversely affected by this environment than any other industries. The coefficient for the following term will be zero: $0 = \lambda_2 (F_j \times E_2)$;
3. For countries in which there exists with low levels of government capacity and high levels of regulation, firms in industries with low costs to entry will not be any more adversely affected by this environment than any other industries. The coefficient for the following term will be zero: $0 = \lambda_3 (F_j \times E_3)$; and
4. For countries in which there exists low levels of government capacity and low levels of regulation, firms in industries with low costs to entry will not be any more adversely affected by this environment than any other industries. The coefficient for the following term will be zero: $0 = \lambda_4 (F_j \times E_4)$.

3.3 Empirical results

The empirical results, shown in Table 6 of the Appendix, support our hypothesis with some exceptions. We find that the results of our specification hold; firms most resembling informal firms are more adversely affected by informal competition though in each of the specifications, the size of the firm is no longer statistically significant. In addition, we find support for our hypothesis; firms in industries with lower entry costs are most adversely affected

by competition from informal firms in environments where there exist relatively high regulatory obligations and high levels of government capacity to enforce the law so that formal firms comply with these obligations. However, we found that it is only in economies with low government capacity and high regulations that all firms, regardless of how difficult it is or is not to enter their market, find informal competition a threat (see Table 7 for test of statistical significance of other interaction term coefficients). Countries in this category are usually Bolivia, Guatemala, Honduras, Nicaragua, Paraguay and Peru, depending on the specific regulation included as an independent variable in the model. Conversely, it is also the case that firms in industries characterized by low entry costs identify informality as a competitive threat even in the best business environments—where there is high government capacity and comparatively low levels of regulation. Firms with relatively lower entry costs in Argentina, Chile, Colombia, Mexico, Panama, and Uruguay, depending on which regulation is included in the regression, will feel the sting of regulation more than firms in industries characterized by high entry costs. Our hypothesis underestimated the sensitivity to regulatory enforcement and its relation to informal competition; even where there is a light regulatory touch but competent enforcement, firms that escape this enforcement and compete in easy to enter markets can affect the profits of formal firms that fully comply with the law. We had predicted that this would only be the case where there were high levels of regulation and competent government enforcement.

Finally, by using the estimated parameters of the linear probability model, and taking tax rate regulation as an example of an enforced regulation, we find that in an economy with relatively onerous tax regulations and a government that poorly enforces its tax code, the percent of firms adversely affected by informal competition will be reduced from 38.8 to 37.7 percent when the government increases enforcement to the level found in the high capacity group of countries. This reduction provides some clues as to what reforms policy makers should look to if they want to reduce the deleterious effects of informality.

4 Conclusions

Using firm level data for 6,466 manufacturing firms across 14 countries in Central and South America, we show that firms that cite informal competition as a top business environment obstacle largely resemble those informal firms that they complain about. Smaller firms, that are more credit constrained, that underutilize their production capacity and that serve smaller customers identify practices of competitors in the informal sector as a serious business constraint. Also, firms operating in capital intensive industries, such as chemical, electronics, machinery and metals, are by and large less likely to see informal competition as a threat.

Moreover we find that firms operating in industries with low costs to entry (proxied by low financial dependence) will be more adversely hit by the regulatory and enforcement business environment in which they operate. More specifically, managers of firms in those industries cite informal competition as top obstacle in countries with high levels of government capacity and high levels of regulation. Firms that risk being caught by skirting the rules will enjoy substantial cost advantages against direct competitors that do not take on that risk and comply with these regulations.

This paper contributes to the ongoing debate on the relationship between the informal sector and the rest of the economy. It clearly shows that formal and informal firms compete against each other and are not in segmented and separate markets. It is a first attempt in identifying the firm and business environment characteristics that are associated with higher degree of impediment to business activities from the informal sector.

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Appendices

Table 1: Description of the variables and data sources

Variables	Description and data sources
Logarithm of the number of employees **(lnemployment)**	Logarithm of the number of employees in the firm. Source: World Bank Enterprise Surveys. Available at: *www.enterprisesurveys.org*.
Logarithm of the time since firm started operations. **(lnage)**	Logarithm of the difference between the year when operations started and the year of the interview plus 1. Source: World Bank Enterprise Surveys. Available at: *www.enterprisesurveys.org*.
Firm has a line of credit and an outstanding commercial loan. **(line)**	Binary variable that indicates whether the firm has *both* a line of credit or outstanding loan *and* an overdraft facility. This variable takes the value 1 if the firm has a *both* a line of credit or outstanding loan *and* an overdraft facility and 0 otherwise. Source: World Bank Enterprise Surveys. Available at: *www.enterprisesurveys.org*.
Average proportion of productive capacity utilized to produce in the last fiscal year. **(caputil)**	It is a percentage of the level of utilization of the facility in comparison with the maximum output that would be possible to produce. Source: World Bank Enterprise Surveys. Available at: *www.enterprisesurveys.org*.
Firm revenues come mostly from sales other than national sales. **(exporter)**	When the percentage of the revenue that comes from national sales is below 90% we consider that the firm is an exporter. Source: World Bank Enterprise Surveys. Available at: *www.enterprisesurveys.org*.
Main buyer of production is a small or medium firm, or individuals. **(buyer)**	The binary dummy variable takes on a value of one (1) when the firm's main buyer of its outputs are medium-size private firms (20-100 workers), small private firms (fewer than 20 workers, or individuals, and a value of zero (0) otherwise. Source: World Bank Enterprise Surveys. Available at: *www.enterprisesurveys.org*.
Industry-level variable indicating the industry to which firm belongs **(i.industry)**	In the manufacturing sub-sample, there are 21 manufacturing industries represented. The list of these can be found in Table 8 of this Appendix. Source: World Bank Enterprise Surveys. Available at: *www.enterprisesurveys.org*.
Industry-level variable	Industry-level Rajan-Zingales (1998) classification of industry is based on how much external financing firms in each industry need to

indicating the financial dependence of industries **(findep)**	operate and grow. Higher values of this index mean that the industry is comparatively more dependent on external financing. Source: Rajan, R. G. and L. Zingales (1998), "Financial dependence and growth," American Economic Review, American Economic Association, 88(3): 559-86.
Tax rate on commercial profits and employers' labor tax, plus the administrative burden of paying taxes. **(tax_rate)**	The tax a company must pay or withhold in a given year to pay profit or corporate income tax and labor taxes. This variable also measures the administrative burden of paying taxes. Taxes are measured at all levels of government. Variable is normalized to a zero to one variable where one (1) indicates the highest tax rate. Source: *Doing Business 2006, Creating Jobs*. Available at: *www.doingbusiness.org*.
Tax rate on commercial profits. **(tax_prof)**	Proportion of profits paid by businesses as a percent of commercial profits. Variable is normalized to a zero to one variable where one (1) indicates the highest tax rate. Source: *Doing Business 2006, Creating Jobs*. Available at: *www.doingbusiness.org*.
Labor taxes paid by employer. **(tax_lab)**	Taxes and mandatory contributions on labor paid by businesses as a percent of commercial profits. Includes mandatory social security contributions paid by the employer both to public and private entities, as well as other taxes or contributions related to employing workers. Variable is normalized to a zero to one variable where one (1) indicates the highest labor tax rate. Source: *Doing Business 2006, Creating Jobs*. Available at: *www.doingbusiness.org*.
Taxes other than profit or labor taxes. **(tax_other)**	Taxes and mandatory contributions paid by the business that are not already included in the previous two categories; taxes on profits and taxes on labor. Variable is normalized to a zero to one variable where one (1) indicates the highest tax rate. Source: *Doing Business 2006, Creating Jobs*. Available at: *www.doingbusiness.org*.
Monetary and administrative costs to start a business.	Total cost to start a business. Costs include obtaining all necessary licenses and permits and completing any required notifications, verifications or inscriptions for the company and employees with relevant authorities.

(sb_cost)	Variable is normalized to a zero to one variable where one (1) indicates the highest startup costs. Source: *Doing Business 2006, Creating Jobs*. Available at: *www.doingbusiness.org*.
Minimum capital requirement to start a business. **(sb_mcap)**	The paid-in minimum capital requirement that the entrepreneur needs to deposit in a bank before registration starts. The minimum capital requirement is computed as percent of per capita income. Variable is normalized to a zero to one variable where one (1) indicates the highest capital requirement costs. Source: *Doing Business 2006, Creating Jobs*. Available at: *www.doingbusiness.org*.
Government effectiveness **(goveff)**	The quality of public and civil services and the degree of its independence from political pressures, the quality of policy formulation and implementation and the credibility of the government's commitment to such policies. Variable is normalized to a zero to one variable where one (1) indicates lowest government effectiveness. Source: World Bank Institute's *Worldwide Governance Indicators.* Available at: http://info.worldbank.org/governance/wgi2007/

Table 2: Descriptive Statistics

Entire sample

Variables	Number of Obs.	Mean	Standard Deviation	Minimum	Maximum
Competition from the informal sector	6466	0.40	0.49	0	1
Firm Size (logarithm of employment)	6386	3.34	1.31	0	9.82
Age of the firm (in log)	6385	2.92	0.78	0	5.28
Access to formal credit	6466	0.69	0.46	0	1
Capacity utilization	6427	70.86	22.20	0	100
Firm exports	6466	0.21	0.40	0	1
Firm sells to small customers	6466	0.64	0.48	0	1

Argentina

Variables	Number of Obs.	Mean	Standard Deviation	Minimum	Maximum
Competition from the informal sector	646	0.34	0.47	0	1
Firm Size (logarithm of employment)	630	3.55	1.44	0.69	9.82
Age of the firm (in log)	646	3.17	0.86	0.69	5.15
Access to formal credit	646	0.64	0.48	0	1
Capacity utilization	641	75.12	20.32	0	110
Firm exports	646	0.28	0.45	0	1
Firm sells to small customers	646	0.61	0.49	0	1

Bolivia

Variables	Number of Obs.	Mean	Standard Deviation	Minimum	Maximum
Competition from the informal sector	366	0.54	0.50	0	1
Firm Size (logarithm of employment)	359	3.21	1.14	1.10	7.18
Age of the firm (in log)	365	2.86	0.78	0.69	4.57
Access to formal credit	366	0.57	0.50	0	1
Capacity utilization	364	63.24	23.75	5	100
Firm exports	366	0.20	0.40	0	1
Firm sells to small customers	366	0.70	0.46	0	1

Colombia

Variables	Number of Obs.	Mean	Standard Deviation	Minimum	Maximum
Competition from the informal sector	634	0.58	0.49	0	1
Firm Size (logarithm of employment)	634	3.10	1.18	1.10	8.22
Age of the firm (in log)	633	2.63	0.81	0.69	4.99
Access to formal credit	634	0.81	0.39	0	1
Capacity utilization	634	69.02	20.93	0	100
Firm exports	634	0.20	0.40	0	1
Firm sells to small customers	634	0.61	0.49	0	1

Mexico

Variables	Number of Obs.	Mean	Standard Deviation	Minimum	Maximum
Competition from the informal sector	1122	0.37	0.48	0	1
Firm Size (logarithm of employment)	1118	3.31	1.39	1.39	8.41
Age of the firm (in log)	1059	2.77	0.71	0	5.28
Access to formal credit	1122	0.64	0.48	0	1
Capacity utilization	1117	74.21	20.13	0	100
Firm exports	1122	0.12	0.32	0	1
Firm sells to small customers	1122	0.81	0.39	0	1

Panama

Variables	Number of Obs.	Mean	Standard Deviation	Minimum	Maximum
Competition from the informal sector	240	0.19	0.39	0	1
Firm Size (logarithm of employment)	232	3.15	1.14	0.85	7.50
Age of the firm (in log)	238	3.07	0.72	0	4.32
Access to formal credit	240	0.80	0.40	0	1
Capacity utilization	236	71.16	24.69	10	100
Firm exports	240	0.15	0.36	0	1
Firm sells to small customers	240	0.55	0.50	0	1

Peru

Variables	Number of Obs.	Mean	Standard Deviation	Minimum	Maximum
Competition from the informal sector	360	0.45	0.50	0	1
Firm Size (logarithm of employment)	358	3.54	1.40	1.25	8.54
Age of the firm (in log)	360	2.77	0.75	1.10	5.03
Access to formal credit	360	0.64	0.48	0	1
Capacity utilization	360	72.03	19.17	15	100
Firm exports	360	0.36	0.48	0	1
Firm sells to small customers	360	0.52	0.50	0	1

Paraguay

Variables	Number of Obs.	Mean	Standard Deviation	Minimum	Maximum
Competition from the informal sector	380	0.49	0.50	0	1
Firm Size (logarithm of employment)	368	3.19	0.97	1.15	6.38
Age of the firm (in log)	376	2.93	0.72	0.69	4.75
Access to formal credit	380	0.67	0.47	0	1
Capacity utilization	378	65.83	25.39	0	100
Firm exports	380	0.19	0.39	0	1
Firm sells to small customers	380	0.64	0.48	0	1

Uruguay

Variables	Number of Obs.	Mean	Standard Deviation	Minimum	Maximum
Competition from the informal sector	360	0.56	0.50	0	1
Firm Size (logarithm of employment)	353	3.10	1.01	1.10	6.46
Age of the firm (in log)	358	3.06	0.91	0.69	4.97
Access to formal credit	360	0.64	0.48	0	1
Capacity utilization	354	67.54	23.10	0	100
Firm exports	360	0.29	0.45	0	1
Firm sells to small customers	360	0.64	0.48	0	1

Chile

Variables	Number of Obs.	Mean	Standard Deviation	Minimum	Maximum
Competition from the informal sector	640	0.29	0.45	0	1
Firm Size (logarithm of employment)	628	3.74	1.24	0	8.41
Age of the firm (in log)	637	3.20	0.71	0.69	5.02
Access to formal credit	640	0.86	0.35	0	1
Capacity utilization	637	71.13	23.48	0	100
Firm exports	640	0.16	0.37	0	1
Firm sells to small customers	640	0.44	0.50	0	1

Ecuador

Variables	Number of Obs.	Mean	Standard Deviation	Minimum	Maximum
Competition from the informal sector	359	0.29	0.45	0	1
Firm Size (logarithm of employment)	353	3.51	1.25	0.69	7.63
Age of the firm (in log)	355	2.98	0.73	1.39	4.76
Access to formal credit	359	0.76	0.43	0	1
Capacity utilization	356	70.12	23.17	5	100
Firm exports	359	0.14	0.34	0	1
Firm sells to small customers	359	0.50	0.50	0	1

El Salvador

Variables	Number of Obs.	Mean	Standard Deviation	Minimum	Maximum
Competition from the informal sector	434	0.41	0.49	0	1
Firm Size (logarithm of employment)	432	3.54	1.45	0.69	8.23
Age of the firm (in log)	434	2.86	0.75	0.69	4.81
Access to formal credit	434	0.74	0.44	0	1
Capacity utilization	432	70.45	21.33	3	100
Firm exports	434	0.32	0.47	0	1
Firm sells to small customers	434	0.56	0.50	0	1

Honduras

Variables	Number of Obs.	Mean	Standard Deviation	Minimum	Maximum
Competition from the informal sector	256	0.34	0.48	0	1
Firm Size (logarithm of employment)	254	3.24	1.42	1.10	7.83
Age of the firm (in log)	255	2.81	0.67	0	4.28
Access to formal credit	256	0.69	0.46	0	1
Capacity utilization	255	76.22	19.84	10	100
Firm exports	256	0.20	0.40	0	1
Firm sells to small customers	256	0.68	0.47	0	1

Guatemala

Variables	Number of Obs.	Mean	Standard Deviation	Minimum	Maximum
Competition from the informal sector	312	0.42	0.49	0	1
Firm Size (logarithm of employment)	310	3.45	1.41	0.69	7.62
Age of the firm (in log)	312	2.89	0.71	0	4.76
Access to formal credit	312	0.68	0.47	0	1
Capacity utilization	306	67.81	23.28	4	100
Firm exports	312	0.29	0.46	0	1
Firm sells to small customers	312	0.67	0.47	0	1

Nicaragua

Variables	Number of Obs.	Mean	Standard Deviation	Minimum	Maximum
Competition from the informal sector	357	0.31	0.46	0	1
Firm Size (logarithm of employment)	357	2.76	1.13	0	7.42
Age of the firm (in log)	357	3.01	0.72	0.69	4.63
Access to formal credit	357	0.49	0.50	0	1
Capacity utilization	357	70.53	22.98	4	100
Firm exports	357	0.14	0.34	0	1
Firm sells to small customers	357	0.79	0.41	0	1

Source: Authors' estimates based on 2006 Enterprise Surveys.

Table 3: Probit Regression Pooled Industry results (industry and regional fixed effects)

Dependent variable: Whether firm ranked practices of informal firms as a top three obstacles

	1	2	3	4	5	6	7
Firm size (in log)	-0.071	-0.087	-0.082	-0.075	-0.070	-0.041	-0.031
	(4.07)***	(4.85)***	(4.43)***	(4.08)***	(3.77)***	(2.17)**	(1.61)*
Age of the firm (in log)		0.098	0.100	0.095	0.093	0.089	0.087
		(4.37)***	(4.43)***	(4.22)***	(4.15)***	(3.99)***	(3.87)***
Access to formal credit			-0.092	-0.085	-0.077	-0.080	-0.078
			(2.15)**	(1.95)*	(1.77)*	(1.84)*	(1.80)*
Capacity utilization					-0.002	-0.002	-0.002
					(1.94)*	(2.05)**	(1.98)**
Firm exports						-0.264	-0.244
						(5.64)***	(5.29)***
Firm has small customers as main buyers							0.142
							(3.55)***
Constant	-0.203	-0.480	-0.473	-0.521	-0.474	-0.502	-0.660
	(0.26)	(0.62)	(0.62)	(0.70)	(0.65)	(0.69)	(0.91)
Observations	6378	6302	6302	6302	6265	6265	6265

Robust z statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Source: Authors' estimates based on 2006 Enterprise Surveys

Table 3.a: Probit model (table 3) with specific reference to the industry dummies

Manufacture industries	1	2	3	4	5	6	7
Omitted industry: textile							
Food product and beverage	-0.151	-0.170	-0.168	-0.162	-0.163	-0.190	-0.194
	(2.19)**	(2.49)**	(2.47)**	(2.37)**	(2.33)**	(2.78)***	(2.84)***
Wearing apparel	0.044	0.040	0.036	0.038	0.046	0.048	0.055
	(0.66)	(0.59)	(0.53)	(0.56)	(0.66)	(0.71)	(0.82)
Tanning and dressing of leather	-0.081	-0.104	-0.110	-0.110	-0.110	-0.102	-0.121
	(0.66)	(0.85)	(0.90)	(0.91)	(0.90)	(0.84)	(0.98)
Wood and wood product	-0.394	-0.421	-0.420	-0.413	-0.416	-0.398	-0.395
	(3.00)***	(3.23)***	(3.22)***	(3.16)***	(3.18)***	(3.03)***	(3.01)***
Paper and paper product	-0.191	-0.224	-0.239	-0.244	-0.248	-0.254	-0.213
	(0.98)	(1.10)	(1.21)	(1.24)	(1.25)	(1.28)	(1.04)
Publishing	-0.155	-0.177	-0.172	-0.160	-0.150	-0.179	-0.146
	(1.44)	(1.56)	(1.51)	(1.40)	(1.31)	(1.55)	(1.25)
Chemicals	-0.312	-0.340	-0.336	-0.324	-0.320	-0.345	-0.333
	(3.69)***	(4.03)***	(4.01)***	(3.78)***	(3.63)***	(3.98)***	(3.88)***
Rubber and Plastic	-0.273	-0.275	-0.267	-0.251	-0.253	-0.261	-0.246
	(2.89)***	(2.90)***	(2.79)***	(2.59)***	(2.59)***	(2.72)***	(2.65)***
Non-metallic mineral product	-0.294	-0.308	-0.308	-0.303	-0.310	-0.324	-0.324
	(2.52)**	(2.67)***	(2.66)***	(2.61)***	(2.68)***	(2.77)***	(2.77)***
Basic metals	-0.177	-0.185	-0.186	-0.173	-0.176	-0.183	-0.161
	(0.75)	(0.77)	(0.77)	(0.70)	(0.71)	(0.74)	(0.63)
Metal Product	-0.401	-0.419	-0.419	-0.410	-0.410	-0.433	-0.415
	(3.19)***	(3.35)***	(3.35)***	(3.29)***	(3.29)***	(3.45)***	(3.37)***
Machinery and Equipment	-0.597	-0.623	-0.620	-0.611	-0.597	-0.597	-0.582
	(4.77)***	(4.83)***	(4.81)***	(4.71)***	(4.68)***	(4.98)***	(4.86)***
Electrical Machinery	-0.354	-0.354	-0.362	-0.355	-0.357	-0.333	-0.325
	(2.38)**	(2.24)**	(2.29)**	(2.27)**	(2.28)**	(2.25)**	(2.22)**

Radio and Television	-0.214	-0.133	-0.135	-0.122	-0.139	-0.094	-0.066
	(1.02)	(0.66)	(0.69)	(0.61)	(0.70)	(0.50)	(0.35)
Motor Vehicle	-0.100	-0.113	-0.114	-0.104	-0.113	-0.137	-0.138
	(0.37)	(0.44)	(0.44)	(0.40)	(0.42)	(0.51)	(0.49)
Other Transport equipment	-0.232	-0.267	-0.294	-0.315	-0.362	-0.388	-0.411
	(0.30)	(0.35)	(0.39)	(0.43)	(0.50)	(0.53)	(0.57)
Furniture	-0.150	-0.187	-0.189	-0.180	-0.175	-0.181	-0.187
	(1.51)	(1.86)*	(1.89)*	(1.79)*	(1.72)*	(1.73)*	(1.76)*

Robust z statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

ISIC codes are used to identify industries

Sources: Authors' estimates based on Enterprise Surveys data 2006

Table 4: Independent variables correlations

	Firm Size	Age of the firm	Access to formal credit	Capacity utilization	Firm exports	Firm sells to small customers
Firm Size	1					
Age of the firm	0.249	1				
Access to formal credit	0.178	0.076	1			
Capacity utilization	0.165	-0.042	0.126	1		
Firm exports	0.359	0.045	0.037	0.044	1	
Firm sells to small customers	-0.262	-0.05	-0.097	-0.06	-0.203	1

Table 5: Probit Regression Pooled Industry results (no industry fixed-effects -industry and regional clustering)

Dependent variable: Firm ranked practices of informal firms as a top three obstacles

	1	2	3	4	5	6	7
Financial Dependence	-0.154	-0.161	-0.157	-0.151	-0.151	-0.157	-0.150
	(3.17)***	(3.36)***	(3.28)***	(3.12)***	(3.05)***	(3.19)***	(3.05)***
Firm size (in log)	-0.064	-0.076	-0.070	-0.062	-0.057	-0.030	-0.020
	(3.73)***	(4.31)***	(3.88)***	(3.48)***	(3.16)***	(1.62)	(1.06)
Age of the firm (in log)		0.077	0.080	0.075	0.072	0.067	0.065
		(3.33)***	(3.42)***	(3.21)***	(3.09)***	(2.91)***	(2.79)***
Access to formal credit			-0.103	-0.094	-0.086	-0.090	-0.088
			(2.40)**	(2.16)**	(1.99)**	(2.08)**	(2.04)**
Capacity utilization					-0.002	-0.002	-0.002
					(1.99)**	(2.08)**	(1.99)**
Firm exports						-0.244	-0.222
						(5.13)***	(4.75)***
Firm sells to small customers							0.151
							(3.73)***
Constant	-0.138	-0.339	-0.302	-0.331	-0.226	-0.233	-0.371
	(0.98)	(2.14)**	(1.93)*	(2.12)**	(1.42)	(1.54)	(2.42)**
Observations	6385	6309	6309	6309	6272	6272	6272

Robust z statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Sources: Authors estimated based on Enterprise Surveys and Rajan-Zingales data

Table 6: Linear Probability Model Regression (country fixed effects and regional-industry clustering)

	(1) TAX RATE	(2) TAX PROFITS	(3) TAX LABOR	(4) TAX OTHER	(5) START BUSINESS COSTS	(6) START CAPITAL COSTS
Financial dependence (Rajan-Zingales)	-0.12	-0.08	-0.08	-0.12	-0.16	-0.06
	(4.30)***	(2.89)***	(2.54)**	(4.30)***	(9.65)***	(1.38)
Low government capacity and low regulation	0.13	0.07	0.15	0.16	0.14	0.04
	(3.39)***	(1.91)*	(2.25)**	(4.07)***	(5.94)***	(0.75)
Low government capacity and high regulation	0.06	-0.01	-0.03	0.06	0.08	-0.04
	(1.21)	(0.15)	(0.54)	(1.21)	(2.62)***	(0.73)
High government capacity and low regulation	0.07	0.06	0.05	0.07		0.05
	(2.14)**	(1.33)	(1.51)	(2.12)**	n.a.	(1.02)
Log of firm employment	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
	(1.37)	(1.26)	(1.26)	(1.36)	(1.28)	(1.33)
Log of firm age	0.02	0.02	0.02	0.02	0.02	0.02
	(2.89)***	(2.87)***	(2.86)***	(2.88)***	(2.89)***	(2.86)***
Use of commercial credit lines	-0.04	-0.04	-0.03	-0.04	-0.03	-0.03
	(2.21)**	(2.21)**	(2.17)**	(2.21)**	(2.19)**	(2.19)**
Capacity utilization	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(2.47)**	(2.47)**	(2.49)**	(2.43)**	(2.46)**	(2.47)**
Firm exports	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08
	(4.88)***	(4.84)***	(4.83)***	(4.97)***	(4.85)***	(4.85)***
Firm has small buyers	0.06	0.06	0.06	0.06	0.06	0.06
	(3.89)***	(3.88)***	(3.80)***	(3.86)***	(3.83)***	(3.91)***
Constant	0.40	0.38	0.38	0.40	0.38	0.39
	(7.25)***	(7.00)***	(6.84)***	(7.25)***	(6.82)***	(7.07)***
Observations	6272	6272	6272	6272	6272	6272
R-squared	0.07	0.06	0.06	0.07	0.06	0.06

Robust t statistics in parentheses
n.a. – estimate is not available for that cell
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7. Test of statistical significance test for difference from zero for interaction terms

Tax rates	
Financial dependence interacted with high regulation-low government capacity	F(1, 418) = 0.14 Prob. > F = 0.7045
Financial dependence interacted with low regulation-high government capacity	F(1, 418) = 2.90* Prob. > F = 0.0893
Financial dependence interacted with low regulation-low government capacity	F(1, 418) = 5.28** Prob. > F = 0.0221
Taxes on profits	
Financial dependence interacted with high regulation-low government capacity	F (1, 418) = 0.47 Prob. > F = 0.4936
Financial dependence interacted with low regulation-high government capacity	F(1, 418) = 5.76** Prob. > F = 0.0168
Financial dependence interacted with low regulation-low government capacity	F(1, 418) = 0.46 Prob. > F = 0.4971
Taxes on labor	
Financial dependence interacted with high regulation-low government capacity	F(1, 418) = 1.45 Prob. > F = 0.2286
Financial dependence interacted with low regulation-high government capacity	F(1, 418) = 5.84** Prob. > F = 0.0161
Financial dependence interacted with low regulation-low government capacity	F(1, 418) = 2.30 Prob.> F = 0.1305
Taxes other than on labor or profits	
Financial dependence interacted with high regulation-low government capacity	F(1, 418) = 1.91 Prob. > F = 0.1673
Financial dependence interacted with low regulation-high government capacity	F(1, 418) = 2.90* Prob. > F= 0.0894
Financial dependence interacted with low regulation-low government capacity	F(1, 418) = 6.59*** Prob. > F = 0.0106
Cost to start a business	
Financial dependence interacted with high regulation-low government capacity	F(1, 418) = 0.83 Prob. > F = .3637
Financial dependence interacted with low regulation-high government capacity	F(1, 418) = 7.59*** Prob. > F = 0.0061
Median capital requirement to start a business	
Financial dependence interacted with high regulation-low government capacity	F(1, 418) = 1.21 Prob. > F = 0.2722
Financial dependence interacted with low regulation-high government capacity	F(1, 418) = 13.66*** Prob. > F = 0.0002
Financial dependence interacted with low regulation-low government capacity	F(1, 418) = 0.17

	Prob. > F= 0.6805

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 8

Industries included in the sample of manufacturing sector (2-digit ISIC Rev.3 code D)		
ISIC and industry name	**Rajan Zingales**	**Number of observations**
15 - Manufacture of food products and beverages	0.14	1,665
17 - Manufacture of textiles	0.40	729
18 - Manufacture of wearing apparel; dressing and dyeing of fur	0.003	1,062
19 - Manufacture of luggage, handbags, saddlery, harness and footwear	-0.14	106
20 - Wood and products of wood and cork, except furniture	0.28	99
21 - Manufacture of paper and paper products	0.18	26
22 - Publishing, printing and reproduction of recorded media	0.2	83
24 - Manufacture of chemicals and chemical products	1.49	923
25 - Manufacture of rubber and plastics products	0.23	248
26 - Manufacture of other non-metallic mineral products	0.006	387
27 - Manufacture of basic metals	0.09	62
28 - Manufacture of fabricated metal products, except machinery and equipment	0.24	372
29 - Manufacture of machinery and equipment n.e.c.	0.45	358
30 - Manufacture of office, accounting and computing machinery	1.06	3
31 - Manufacture of electrical machinery and apparatus n.e.c.	0.77	102
32 - Manufacture of radio, television and communication equipment and apparatus	1.04	48
33 - Manufacture of medical, precision and optical instruments, watches and clocks	0.96	5
34 - Manufacture of motor vehicles, trailers and semi-trailers	0.39	17
35 - Manufacture of other transport equipment	0.31	3
36 - Manufacture of furniture; manufacturing n.e.c.	0.24	168
Total		**6,466**

Source: United Nations website: http://unstats.un.org/unsd/cr/registry/regcs.asp?Cl=2&Lg=1&Co=D,

Source: Rajan et al (1998)

Source: Enterprise Surveys, manufacturing sub-sample.